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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,291	04/14/2004	Jeffrey D. Muhs	0735.3 (63967.US)	6054
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ORNL-UTB-LUEDEKA, NEELEY & GRAHAM			EXAMINER	
P.O. BOX 1871			HALL, ASHA J	
KNOXVILLE, TN 37901			ART UNIT	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/824,291	<b>Applicant(s)</b> MUHS ET AL.
	<b>Examiner</b> ASHA HALL	<b>Art Unit</b> 1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 19 March 2008.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-3-6 and 8-12 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1 and 3-12 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 19 March 2008 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_

5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 19, 2008 has been entered.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 5, 6, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society) in view of Levinson (US Patent 5,271,079).

As to claim 1, Muhs discloses a hybrid solar energy distribution system (hybrid lighting system, Figure 3, and described in the first paragraph in left column of page 3) with a preferred design for its collector (preferred design for the hybrid solar collector,

Figure 6a). Muhs discloses that a receiver for receiving visible light (concentric fiber mount assembly, 3, along with the large core optical fibers, 4) that contains at least one fiber; a receiver housing (the housing surrounds the fibers and is shown in both Figures 6a and 6b), a fiber at least partially disposed in said housing (as detailed in Figure 6b), said fiber further transmitting visible light to a light distribution system ("light distribution system," 3, first paragraph in left column of page 3) further comprising at least one fiber distribution panel (Figure 6b); at least one hybrid luminaire ("hybrid luminaires," 5, in left column of page 3), and a means for controlling at least one of said hybrid luminaire and said light distribution system ("hybrid lighting control systems," 4, in left column of page 3). What Muhs fails to disclose is a mixing rod removably disposed in said receiver housing.

Levinson discloses a light mixing device that uses a mixing rod (14) to take supplied from a plurality of light generating devices and direct it evenly to a plurality of optical fibers (56) (Figures 1 and 2). Levinson teaches the use of said mixing rod to "collect more of the light emitted from a light source and supply that light to a plurality of optical fibers" (Column 2, lines 29-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mixing rod of Levinson to the receiver of Muhs in order to collect more of the light emitted from the light source (i.e., the sun) and supply that light to the plurality of optical fibers (large core optical fibers, 4).

As to claim 3, Muhs teaches that the hybrid luminaires may incorporate "light originating from two or more sources, at least one being natural and another being electric" in the bottom paragraph of the right column of page 3. Muhs specifies sunlight

as a natural lighting source for the hybrid luminaries in the second paragraph from the bottom in the left column of page 3 with the sentence: "Hybrid lighting systems will depend on electric lamps when sunlight is incapable of supplying sufficient levels of illumination such as on cloudy, overcast days and at night." Muhs further specifies that the electric source may be "conventional fluorescent lamps located in luminaries" in the bottom paragraph of the left column of page 3.

As to claim 5, Muhs discloses a hybrid collector (preferred design for the hybrid solar collector, Figure 6a). Muhs discloses a primary mirror for producing reflected full spectrum solar radiation (primary mirror, 1, Figure 6a), as well as a Secondary Optical Element (Secondary Optical Element, 2) whose purpose is to "focus visible, nondiffuse solar energy onto a series of centrally located, large-core optical fibers, while at the same time focusing the rejected infrared (IR) solar radiation onto a concentrating PV cell located at the back of the secondary optical element" (bottom paragraph of left column, page 4). This Secondary Optical Element reflects visible light and, therefore, is a secondary mirror. In fact, it is referred to as a "spectrally selective cold mirror" by Muhs in the top paragraph of the left column of page 4. Said Secondary Optical Element can also be considered to be a filter in the sense that it filters the solar radiation into visible light before it reflects it onto the fiber receivers (concentric fiber mount assembly, 3, along with the large core optical fibers, 4), as recited above and originally described in the bottom paragraph of the left column on page 4. Muhs further discloses a receiver for receiving visible light that contains at least one fiber; a receiver housing (the housing surrounds the fibers and is shown in both Figures 6a and 6b), a fiber at least partially

disposed in said housing (as detailed in Figure 6b). Muhs discloses further comprising at least one fiber distribution panel (Figure 6b); at least one hybrid luminaire/hybrid luminaires (5) (column 1, p.3), and a means for controlling at least one of said hybrid luminaire and said light distribution system/hybrid lighting control systems (4) (column 1, p.3). However, Muhs fails to disclose is a mixing rod removably disposed in said receiver housing.

Levinson discloses a light mixing device that uses a mixing rod (14) to take supplied from a plurality of light generating devices and direct it evenly to a plurality of optical fibers (56) (Figures 1 and 2). Levinson teaches that the use of said mixing rod is effective to "collect more of the light emitted from a light source and supply that light to a plurality of optical fibers" (Column 2, lines 29-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mixing rod of Levinson to the receiver of Muhs in order to collect more of the light emitted from the light source (i.e., the sun) and supply that light to the plurality of optical fibers (large core optical fibers, 4).

As to claim 6, the secondary mount supporting the secondary mirror (in the Secondary Optical Element) of Muhs is shown in Figure 6a. Said structure is non-rigid in the sense that it allows the tilting of the eight flat sections of the secondary mirror by 2° (top paragraph, right column, page 5). Although Muhs quotes a blocking fraction of 5 % (top paragraph, right column, page 5), he also states that this fraction can be reduced upon routine optimization by one skilled in the art. In the same paragraph he states that

such "optimization routines will likely reduce the blocking fraction to less than 3.0 % in future designs."

As to claim 9, Muhs shows the positioning of multiple collectors in a mirror farm array in Figure 5 and refers to the sun tracking system in Figure 6a (conventional rotational tracking mechanism, 6). Muhs mentions explicitly that these are solar collectors (caption, Figure 5). Therefore, the purpose of their tracking mechanisms is to track a single object (i.e., the sun). It would have been obvious to one of ordinary skill in the art to connect them to a single tracking system that tracks the position of the sun.

As to claim 11, Mohs describes an initial embodiment of the secondary mirror, which is part of said Secondary Optical Element, in the top paragraph of the right column of page 5 that "made of up of eight flat sections."

4. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society), Levinson (US Patent 5,271,079) as applied to claims 1 and 5 above and in further view of Nagao et al. (US Patent 3,626,040).

The combination of Muhs and Levinson teaches all the limitations of claims 1 and 5 above and further teaches that the system contains a bundle of fibers (approximately eight 18-mm large-core optical fibers, 4, Figure 6a), but does not teach that the fiber bundle comprises a thermally compressed fiber bundle.

Nagao et al. teach a method for making fused bundles of light-conducting fibers in which the fibers are placed within a mold, "heated to fusing temperature and

Art Unit: 1795

compressed" with the aid of an applied pressure. As explained in column 1, lines 24-26, the fiber bundles resulting from this process have the advantage of being virtually free of "non-uniform distortions" and, therefore, improved optical performance. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the fiber bundles of the modified device of Muhs with the thermally compressed fiber bundles of Nagao et al. in order to improve the optical performance of the latter by virtually eliminating non-uniform distortions in the fiber bundle.

5. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muhs (J. D. Muhs, "Design and Analysis of Hybrid Solar Lighting and Full-Spectrum Solar Energy Systems", Solar 2000, July 16-21, 2000, American Solar Energy Society) in view of Levinson (US Patent 5,271,079) as applied to claim 5 and in further view of Kessler et al. (US Patent 6,416,181).

The combination of Muhs and Levinson above discloses all of the features of claim 5 and describes an initial embodiment of the secondary mirror, which is part of said Secondary Optical Element, in the top paragraph of the right column of page 5 that "made of up of eight flat sections". What the modified device of Muhs fails to provide is the primary mirror is segmented into multiple sections.

Kessler et al. disclose a large curved mirror (24) similar in shape and reflective function to the primary mirror of Muhs as part of a monocentric autostereoscopic optical apparatus (Figure 1). As Kessler et al. explain in column 12 lines 9-13, it is less expensive and more practical to assemble such a curved mirror from "two or more smaller mirror segments." It would have been obvious to one of ordinary skill in the art

at the time of the invention to provide segmented mirror of Kessler et al. as the primary mirror in the collector of the modified device of Muhs in order to provide for a less expensive and more practical assembly of said mirror.

***Response to Arguments***

Amendments to Specification

6. The amendment to the specification filed on March 19, 2008 is acknowledged.

Due to the amendment to paragraph 22.1 the objection to the specification is withdrawn.

Drawings

7. Due to cancellation of Figure 12 and the replacement of the sheets of drawings consisting of 11 Figures, the objection to the drawings has been withdrawn.

Claim Rejections 35 USC 103

8. With respect to claim 1, the Applicant argues that Levinson's mixing rod is sufficient only for artificial light such as the LED elements he teaches and claims. Therefore, the combination of Muhs and Levinson is non-functional in the applicants' solar light distribution system invention because the mixing rod will not withstand the duty requirements for mixing concentrated solar radiation.

The Examiner respectfully disagrees. Levinson teaches that the mixing rod collects more of the light emitted from a light source and supply that light to a plurality of optical fibers (col.2; lines: 29-31). In this case, the light source encompasses solar radiation as a light source.

9. The Applicant argues that Muhs does not describe, teach or suggest use of a fiber distribution panel. This misinterpretation is likely due to the poor image quality of the copy of the cited reference that was reviewed by the Examiner.

The Examiner respectfully disagrees. Muhs discloses that a receiver for receiving visible light (concentric fiber mount assembly, 3, along with the large core optical fibers, 4) that contains at least one fiber; a receiver housing (the housing surrounds the fibers and is shown in both Figures 6a and 6b), a fiber at least partially disposed in said housing (as detailed in Figure 6b), said fiber further transmitting visible light to a light distribution system ("light distribution system," 3, first paragraph in left column of page 3) further comprising at least one fiber distribution panel (Figure 6b); at least one hybrid luminaire ("hybrid luminaires," 5, in left column of page 3), and a means for controlling at least one of said hybrid luminaire and said light distribution system ("hybrid lighting control systems," 4, in left column of page 3).

10. The Applicant argues that Levinson does not fulfill the deficiencies of the Muhs reference.

The Examiner respectfully disagrees. Levinson discloses a light mixing device that uses a mixing rod (14) to take supplied from a plurality of light generating devices and direct it evenly to a plurality of optical fibers (56) (Figures 1 and 2). Levinson teaches the use of said mixing rod to "collect more of the light emitted from a light source and supply that light to a plurality of optical fibers" (Column 2, lines 29-31).

***Conclusion***

11. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ASHA HALL whose telephone number is (571)272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH  
/A. H./  
Examiner, Art Unit 1795

/Alexa D. Neckel/  
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